



GAU-1645
PATENT
Attorney Docket No. UCSD-0426

RECEIVED
AUG 29 2001
FBI CENTER 1600/2900
PH 5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: James A. Spudich *et al.*
Serial No.: 09/486,480
Filed: 02/28/00
Entitled: Reversible Immobilization of Arginine-Tagged
Moieties On A Silicate Surface

Group No.:
Examiner:

INFORMATION DISCLOSURE
STATEMENT TRANSMITTAL

Assistant Commissioner for Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8(a)(1)(i)(A)

I hereby certify that this correspondence (along with any referred to as being attached or enclosed) is, on the date shown below, being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Dated: August 22, 2001

By: James R. Davenport

Sir or Madam:

Enclosed please find an Information Disclosure Statement and Form PTO-1449, including copies of the references contained thereon, for filing in the U.S. Patent and Trademark Office.

The Commissioner is hereby authorized to charge any additional fee or credit overpayment to our Deposit Account No. 08-1290. An originally executed duplicate of this transmittal is enclosed for this purpose.

Dated: August 22, 2001

Kamrin T. MacKnight
Kamrin T. MacKnight
Registration No. 38,230

MEDLEN & CARROLL, LLP
220 Montgomery Street, Suite 2200
San Francisco, California 94104
415/705-8410

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: James A. Spudich *et al.*

Serial No.: 09/486,480

Group No.:

Filed: 02/28/00


Examiner:

Entitled: **Reversible Immobilization of Arginine-Tagged
Moieties On A Silicate Surface**



INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

| | |
|--|---|
| CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8(a)(1)(i)(A) | |
| <p>I hereby certify that this correspondence (along with any referred to as being attached or enclosed) is, on the date shown below, being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.</p> | |
| Dated: <u>August 22, 2001</u> | By:  James R. Davenport |

Sir or Madam:

The citations listed below, copies attached, may be material to the examination of the above-identified application, and are therefore submitted in compliance with the duty of disclosure defined in 37 C.F.R. §§ 1.56 and 1.97. The Examiner is requested to make these citations of official record in this application.

The following patents are referred to in the body of the specification:

- U.S. Patent No. 4,239,519 issued 12/16/80 to Beall *et al.*;
- U.S. Patent No. 4,297,139 issued 10/27/81 to Beall *et al.*
- U.S. Patent No. 4,339,540 issued 7/13/82 to Beall *et al.*;
- U.S. Patent No. 4,671,958 issued 6/9/87 to Rodwell *et al.*;
- U.S. Patent No. 4,659,839 issued 4/21/87 to Nicolotti *et al.*;
- EP 0 188,256 published Aug. 21, 1991;
- U.S. Patent No. 4,699,784 issued 10/13/87 to Shih *et al.*;
- U.S. Patent No. 4,680,338 issued 7/14/87 to Sundoro;
- U.S. Patent No. 4,569,789 issued 2/11/86 to Blattler *et al.*;

- U.S. Patent No. 4,589,071 issued 5/13/86 to Yamamuro *et al.*;
- U.S. Patent No. 4,545,985 issued 10/8/85 to Pastan *et al.*;
- U.S. Patent No. 4,894,443 issued 1/16/90 to Greenfield *et al.*;
- U.S. Patent No. 4,618,492 issued 10/21/86 to Blattler *et al.*;
- U.S. Patent No. 4,542,225 issued 9/17/85 to Blattler *et al.*;
- U.S. Patent No. 4,625,014 issued 11/25/86 to Senter *et al.*;
- U.S. Patent No. 5,539,083 issued 7/23/96 to Cook *et al.*;
- U.S. Patent No. 5,539,082 issued 7/23/96 to Nielsen *et al.*;
- U.S. Patent No. 5,017,478 issued 5/21/91 to Cashion *et al.*;
- EP 0 246 864 published July 13, 1994;
- U.S. Patent No. 4,683,202 issued 7/28/87 to Mullis;
- U.S. Patent No. 4,511,503 issued 4/16/85 to Olson *et al.*;
- U.S. Patent No. 5,010,175 issued 4/23/91 to Rutter *et al.*
- WO 91/19735, 1991 published Dec. 26, 1991;
- WO 93/20242, 1993 published Oct. 14, 1993;
- WO 92/00091, 1992 published Jan. 9, 1992;
- U.S. Patent No. 5,288,514 issued 2/22/94 to Ellman;
- WO 97/00271 published Jan. 3, 1997;
- U.S. Patent No. 5,593,853 issued 1/14/97 to Chen *et al.*;
- U.S. Patent No. 5,569,588 issued 10/29/96 to Ashby *et al.*;
- U.S. Patent No. 5,549,974 issued 8/27/96 to Holmes;
- U.S. Patent No. 5,559,410 issued 9/24/96 to Papazian *et al.*;
- U.S. Patent No. 5,585,639 issued 12/17/96 to Dorsel *et al.*;
- U.S. Patent No. 5,576,220 issued 11/19/96 to Hudson *et al.*;
- U.S. Patent No. 5,541,061 issued 7/30/96 to Fodor *et al.*;
- U.S. Patent No. 4,366,241 issued 12/28/82 to Tom *et al.*;
- U.S. Patent No. 4,376,110 issued 3/8/83 to David *et al.*;
- U.S. Patent No. 4,517,288 issued 5/14/85 to Giegel *et al.*;
- U.S. Patent No. 4,837,168 issued 6/6/89 to de Jaeger *et al.*; and
- U.S. Patent No. 5,532,142 issued 7/2/96 to Johnston *et al.*

The following publications are referred to in the body of the specification:

- Porath *et al.* (1975) "Metal chelate affinity chromatography, a new approach to protein fractionation," *Nature* 258:598-599;
- Collioud *et al.* (1993) "Oriented and Covalent Immobilization of Target Molecules to Solid Supports: Synthesis and Application of a Light-Activatable and Thiol-Reactive Cross-Linking Reagent," *Bioconjugate Chem.* 4:528-536;
- Schuhmann *et al.* (1991) "Immobilization of Enzymes on Langmuir-Blodgett Films via a Membrane-Bound Receptor. Possible Applications for Amperometric Biosensors," *Adv. Mater.* 3:388-391;
- Lu *et al.* (1995) "Oriented Immobilization of Fab' Fragments on Silica Surfaces," *Anal. Chem.* 67:83-87;
- Iwane *et al.* (1997) "Myosin Subfragment-1 Is Fully Equipped with Factors Essential for Motor Function," *Biophys. Biochem. Res. Comm.* 230:76-80;
- Ng *et al.* (1995) "Engineering Protein - Lipid Interactions: Targeting of Histidine-Tagged Proteins to Metal-Chelating Lipid Monolayers," *Langmuir* 11:4048-4055;
- Schmitt *et al.* (1996) "Specific Proteins Docking to Chelator Lipid Monolayers Monitored by FT-IR Spectroscopy at the Air-Water Interface; *Agnew. Chem. Int. Ed. Engl.* 35:317-320;
- Frey *et al.* (1996) "Two-dimensional protein crystallization via metal-ion coordination by naturally occurring surface histidines," *Proc. Natl. Acad. Sci. USA* 93:4937-4941;
- Kubalek *et al.* (1994) "Two-Dimensional Crystallization of Histidine-Tagged, HIV-1 Reverse Transcriptase Promoted by a Novel Nickel-Chelating Lipid," *J. Struct. Biol.* 113:117-123;
- Sigal *et al.* (1996) "A Self-Assembled Monolayer for the Binding and Study of Histidine-Tagged Proteins by Surface Plasmon Resonance," *Anal. Chem.* 68:490-497;
- Zahn *et al.* (1993) "Two-dimensional Crystals of the Molecular Chaperone GroEL Reveal Structural Plasticity," *J. Mol. Biol.* 229:579-584;
- Yang *et al.* (1994) "Structure and stability of pertussis toxin studied by in situ atomic force microscopy," *FEBS Lett.* 338:89-92;

- Guckenberger *et al.* (1994) "Scanning Tunneling Microscopy of Insulators and Biological Specimens Based on Lateral Conductivity of Ultrathin Water Films," Science 266:1538-1540;
- Müller *et al.* (1996) "Immuno-Atomic Force Microscopy of Purple Membrane," Biophys. J. 70:1796-1802;
- Woodward *et al.* (1996) "*In Situ* Observation of Self-Assembled Monolayer Growth," J. Am. Chem. Soc. 118:7861-7862;
- Schwartz *et al.* (1992) "Growth of a Self-Assmebled Monolayer by Fractal Aggregation," Phys. Rev. Lett. 69:3354-3357;
- Okusa *et al.* (1994) "Chemical Modification of Molecularly Smooth Mica Surface and Protein Attachment," Langmuir 10:3577-3581;
- Hu *et al.* (1996) "Imaging of Single Extendedf DNA Molecules on Flat (Aminopropyl)triethoxysilane-Mica by Atomic Force Microscopy," Langmuir 12:1697-1700;
- Xiao *et al.* (1996) "Chain Length Dependence of the Frictional Properties of Alkysilane Molecules Self-Assembled on Mica Studied by Atomic Force Microscopy," Langmuir 12:235-237;
- Britt *et al.* (1996) "An AFM Study of the Effects of Silanization Temperature, Hydration, and Annealing on the Nucleation and Aggregation of Condensed OTS Domains on Mica," J. Colloid Interface Sci. 178:775-784;
- Shelden *et al.* (1993) "Ion Exchange on Muscovite Mica with Ultrahigh Specific Surface Area," J. Colloid Interface Sci. 157:318-327;
- Hähner *et al.* (1996) "Orientation and electronic structure of methylene blue on mica: A near edge x-ray absorption fine structure spectroscopy study," J. Chem. Phys. 104:7749-7757;
- Sharma *et al.* (1996) "Characterization of Adsorbed Ionic Surfactants on a Mica Substrate," Langmuir 12:6506-6512;
- Eriksson *et al.* (1996) "Equilibrium Wetting Studies of Cationic Surfactant Adsorption on Mica, 1. Mono- and Bilayer Adsorption of CTAB," J. Colloid Interface Sci. 181:476-489;

- Hansma *et al.* (1995) "Applications for Atomic Force Microscopy of DNA," Biophys. J. 68:1672-1677;
- Shelden *et al.* (1994) "Nanophase molecular droplets: individual polystyrene molecules of mica imaged with scanning electron and atomic-force microscopy," Polymer 35:1571-1575;
- Spudich (1994) "How molecular motors work," Nature 372:515-518;
- Borlinghaus *et al.* (1987) "Radiosensitizer Conjugation to the Carcinoma 19-9 Monoclonal Antibody," Cancer Res. 47:4071-4075;
- Thorpe *et al.* (1982) in *Monoclonal Antibodies in Clinical Medicine*; Academic Press, pp. 168-190;
- Waldmann (1991) "Monoclonal Antibodies in Diagnosis and Therapy," Science 252:1657;
- Barany and Merrifield, *Solid-Phase Peptide Synthesis*, pp. 3-284 in *The Peptides: Analysis, Synthesis, Biology. Vol 2: Special Methods in Peptide Synthesis, Part A*;
- Merrifield *et al.* (1963) "Solid Phase Peptide Synthesis. I. The Synthesis of a Tetrapeptide," J. Am. Chem. Soc. 85:2149-2156;
- Stewart *et al.*, *Solid Phase Peptide Synthesis*, 2nd ed., Pierce Chem. Co., Rockford, IL, 1984;
- Beaucage *et al.* (1981) "Deoxynucleoside Phosphoramidites - A New Class of Key Intermediates for Deoxypolynucleotide Synthesis," Tetra. Lett. 22:1859-1862;
- Matteucci *et al.* (1981) "Synthesis of Deoxyoligonucleotides on a Polymer Support," J. Am. Chem. Soc. 103:3185;
- Berger and Kimmel, *Guide to Molecular Cloning Techniques, Methods in Enzymology, Volume 152*, Academic Press, Inc., San Diego, CA;
- Sambrook *et al.* (1989) *Molecular Cloning, A Laboratory Manual, 2nd ed., Vol. 1-3*, Cold Spring Harbor Laboratory, Cold Spring Harbor Press, NY;
- *Current Protocols in Molecular Biology*, F. M. Ausubel *et al.*, eds., Current Protocols, a joint venture between Greene Publishing Associates, Inc. and John Wiley & Sons, Inc., (1994 Supplement);

- Innis *et al.* (1990) *PCR Protocols, A Guide to Methods and Applications*, Academic Press Inc., San Diego, CA;
- Arnheim & Levinson (October 1, 1990) C&EN, pp 36-47¹;
- Kwoh *et al.* (1989) "Transcription-based amplification system and detection of amplified human immunodeficiency virus type 1 with a bead-based sandwich hybridization format," *Proc. Natl. Acad. Sci. USA* 86:1173;
- Guatelli *et al.* (1990) "Isothermal, *in vitro* amplification of nucleic acids by a multienzyme reaction modeled after retroviral replication," *Proc. Natl. Acad. Sci. USA* 87:1874;
- Lomell *et al.* (1989) "Quantitative Assays Based on the Use of Replicable Hybridization Probes," *J. Clin. Chem.* 35:1826;
- Landegren *et al.* (1988) "A Ligase-Mediated Gene Detection Technique," *Science* 241:1077-1080;
- Van Brunt (1990) "Amplifying Genes: PCR and Its Alternatives," *Bio/Technology* 8:291-294;
- Wu and Wallace (1989) Wu and Wallace, "The Ligation Amplification Reaction (LAR) - Amplification of Specific DNA Sequences Using Sequential Rounds of Template-Dependent Ligation," *Genomics* 4:560;
- Barringer *et al.* (1990) "Blunt-end and single-strand ligations by *Escherichia coli* ligase: influence on an *in vitro* amplification scheme," *Gene* 89:117;
- Yanofsky (1984) "Repression Is Relieved Before Attenuation in the *trp* Operon of *Escherichia coli* as Tryptophan Starvation Becomes Increasingly Severe," *J. Bacteriol.* 158:1018-1024;
- Herskowitz *et al.* (1980) "The Lysis-Lysogeny Decision of Phage λ : Explicit Programming and Responsiveness," *Ann. Rev. Genet.* 14:399-445;
- Sherman *et al.* (1982) *Methods in Yeast Genetics*, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY;
- Wahleithner *et al.* (1991) "Expression and assembly of spectrally active recombinant holophytochrome," *Proc. Natl. Acad. Sci. USA* 88:10387-10391;

¹ Applicant is unable to locate and provide Examiner with a copy of this reference at this time.

- Murphy and Lagarias (1997) "Purification and Characterization of Recombinant Affinity Peptide-Tagged Oat Phytochrome A," *Photochem. Photobiol.* 65:750-758;
- Wu *et al.* (1996) "The methylotrophic yeast *Pichia pastoris* synthesizes a functionally active chromophore precursor of the plant photoreceptor phytochrome," *Proc. Natl. Acad. Sci. USA* 93:8989-8994;
- Botstein *et al.* (1979) "Sterile Host Yeasts (SHY): A Eukaryotic System of Biological Containment for Recombinant DNA Experiments," *Gene* 8:17-24;
- Broach *et al.* (1979) "Transformation in Yeast: Development of a Hybrid Cloning Vector and Isolation of the *CAN1* Gene," *Gene* 8:121-133;
- Paszkowski *et al.* (1984) "Direct gene transfer to plants," *Embo. J.* 3:2717-2722;
- Fromm *et al.* (1985) "Expression of genes transferred into monocot and dicot plant cells by electroporation," *Proc. Natl. Acad. Sci. USA* 82:5824;
- Klein *et al.* (1987) "High-velocity microprojectiles for delivering nucleic acids into living cells," *Nature* 327:70-73;
- Fisk *et al.* (1993) "The introduction and expression of transgenes in plants," *Scientia Horticulturae* 55:5-36;
- Potrykus (1990) "Gene transfer methods for plants and cell cultures," *CIBA Found. Symp.* 154:198;
- Horsch *et al.* (1984) "Inheritance of Functional Foreign Genes in Plants," *Science* 233:496-498;
- Fraley *et al.* (1983) "Expression of bacterial genes in plant cells," *Proc. Natl. Acad. Sci. USA* 80:4803;
- Hooykaas (1989) "Transformation of plant cells via *Agrobacterium*," *Plant Mol. Biol.* 13:327-336;
- Bechtold *et al.* (1993) "*In planta Agrobacterium* mediated gene transfer by infiltration of adult *Arabidopsis thaliana* plants," *Comptes Rendus De L Academie Des Sciences Serie Iii-Sciences De La Vie-Life Sciences* 316:1194-1199;

- Valvekens *et al.* (1988) "*Agrobacterium tumefaciens*-mediated transformation of *Arabidopsis thaliana* root explants by using kanamycin selection," Proc. Natl. Acad. Sci. USA 85:5536-5540;
- de la Peña *et al.* (1987) "Transgenic rye plants obtained by injecting DNA into young floral tillers," Nature 325:274-276;
- Rhodes *et al.* (1988) "Genetically Transformed Maize Plants from Protoplasts," Science 240:204-207;
- Shimamoto *et al.* (1989) "Fertile transgenic rice plants regenerated from transformed protoplasts," Nature 338:274-276;
- Shuerman *et al.* (1993) "Transformation of temperate woody crops: Progress and potentials," Scientia Horticulturae 55:101-124;
- James *et al.* (1989) "Genetic transformation of apple (*Malus pumila* Mill.) using a disarmed Ti-binary vector," Plant Cell. Rep. 7:658-661;
- Evans *et al.* (1983), pp. 124-176 in *Protoplasts Isolation and Culture, Handbook of Plant Cell Culture*, MacMillan Publishing Company, NY;
- Binding, Regeneration of Plants in *Plant Protoplasts*, pp. 21-37; CRC Press, Boca Raton, FL, 1985;
- Klee *et al.* (1987) "*Agrobacterium*-Mediated Plant Transformation and Its Further Applications to Plant Biology," Ann. Rev. Plant Physiol. 38:467-86;
- Berman *et al.* (1983) "Detection of Antibodies to Herpes Simplex Virus with a Continuous Cell Line Expressing Cloned Glycoprotein D," Science 222:524-527;
- Thomsen *et al.* (1984) "Promoter-regulatory region of the major immediate early gene of human cytomegalovirus," Proc. Natl. Acad. Sci. 81:659-663;
- Brinster *et al.* (1982) "Regulation of metallothionein-thymidine kinase fusion plasmids injected into mouse eggs," Nature 296:39-42;
- Gallop *et al.* (1994) "Applications of Combinatorial Technologies to Drug Discovery. 1. Background and Peptide Combinatorial Libraries," J. Med. Chem. 37(9):1233-1251;
- Furka (1991) "General method for rapid synthesis of multicomponent peptide mixtures," Int. J. Pept. Prot. Res. 37:487-493;

- Houghten *et al.* (1991) "Generation and use of synthetic peptide combinatorial libraries for basic research and drug discovery," *Nature* 354:84-88;
- Hagihara *et al.* (1992) "Vinylogous Polypeptides: An Alternative Peptide Backbone," *J. Amer. Chem. Soc.* 114:6568;
- Hirschmann *et al.* (1992) "Nonpeptidal Peptidomimetics with a β -D-Glucose Scaffolding. A Partial Somatostatin Agonist Bearing a Close Structural Relationship to a Potent, Selective Substance P Antagonist," *J. Amer. Chem. Soc.* 114:9217-9218;
- Chen *et al.* (1994) "'Analogous" Organic Synthesis of Small-Compound Libraries: Validation of Combinatorial Chemistry in Small-Molecule Synthesis," *J. Amer. Chem. Soc.* 116:2661;
- Cho *et al.* (1993) "An Unnatural Biopolymer," *Science* 261:1303;
- Campbell *et al.* (1994) "Phosphonate Ester Synthesis Using a Modified Mitsunobu Condensation," *J. Org. Chem.* 59:658;
- Gordon *et al.* (1994) "Applications of Combinatorial Technologies to Drug Discovery. 2. Combinatorial Prgamoc Synthesis, Library Screening Strategies, and Future Directions." *J. Med. Chem.* 37:1386;
- Vaughan *et al.* (1996) "Human Antibodies with Sub-nanomolar Affinities Isolated from a Large Non-immunized Phage Display Library," *Nature Biotechnology* 14(3):309-314;
- Liang *et al.* (1996) "Parallel Synthesis and Screening of a Solid Phase Carbohydrate Library," *Science* 274:1520-1522;
- Baum (1993) "Solid-phase synthesis of benzodiazepines," *C&EN*, Jan. 18, pp. 33-34;
- Gittes *et al.* (1996) "Directional Loading of the Kinesin Motor Molecule as it Buckles a Microtubule," *Biophys. J.* 70(1):418-29;
- Shirakawa *et al.* (1995) "The Mode of ATP-Dependent Microtubule-Kinesin Sliding in the Auxotonic Condition," *J. Exp. Biol.* 198:1809-15;
- Vale and Kreis, 1993, *Guidebook to the Cytoskeletal and Motor Proteins*, NY, Oxford University Press;

- Goldstein (1993) "With Apologies to Scheherazade: Tails of 1001 Kinesin Motors," *Ann. Rev. Genetics* 27:319-351;
- Mooseker and Cheney (1995) "Unconventional Myosins," *Annu. Rev. Cell Biol.* 11:633-675;
- *Methods in Cell Biology, Volume 37: Antibodies in Cell Biology*, David J. Asai, ed., Academic Press, Inc., NY, 1993;
- Stites and Terr (1991) in *Basic and Clinical Immunology*, 7th ed., Appleton & Lange, Norwalk, Connecticut;
- Chalfie *et al.* (1994) "Green Fluorescent Protein as a Marker for Gene Expression," *Science* 263:801-805; and
- Yang *et al.* (1996) "The molecular structure of green fluorescent protein," *Nature Biotechnology* 14:1246-1251.


The citations listed below, copies attached, were cited in the parent of this application, PCT Application No. PCT/US98/1853, in the International Search Report mailed Dec. 23, 1998, and are therefore submitted in compliance with the duty of disclosure defined in 37 C.F.R. §§ 1.56 and 1.97. The Examiner is requested to make these citations of official record in this application.

- U.S. Patent No. 5,536,382 issued 7/16/96 to Sunzeri;
- U.S. Patent No. 4,448,715 issued 5/15/84 to Ryan *et al.*;
- Nock *et al.* (1997) "Reversible, site-specific immobilization of polyarginine-tagged fusion proteins on mica surfaces," *FEBS Letters* 414:233-238;
- Wagner *et al.* (1997) "Bioreactive self-assembled monolayers on hydrogen-passivated Si (111) as a new class of atomically flat substrates for biological scanning probe microscopy," *J.Struct. Biol.* 119:189-201;
- Spudich *et al.* (1996) "Effect of different surfaces and binding modes on the velocity of a single-headed myosin fragment in the in vitro motility assay," *Mol. Biol. of the Cell* 7:35a, Abstract 206;
- Spudich (1994) "How molecular motors work," *Nature* 372:515-518;
- Hirabayashi *et al.* (1992) "Arginine-tail method, an affinity tag procedure utilizing anhydrotypsin agarose," *J. Chromatogr.* 597:181-187; and

- Geke *et al.* (1997) "Ion exchange of cation-terminated poly(ethylene oxide) chains of mica surfaces," J. Colloid. Interface Sci. 189:283-287.

This Information Disclosure Statement under 37 C.F.R. §§ 1.56 and 1.97 is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that any one or more of these citations constitutes prior art.

Dated: 22 August 2001


Kamrin T. MacKnight
Registration No. 38,230

MEDLEN & CARROLL,LLP
220 Montgomery Street, Suite 2200
San Francisco, California 94104
415/705-8410